SCIENCE.

FRIDAY, NOVEMBER 28, 1884.

COMMENT AND CRITICISM.

THE PRIMARY work of our Hydrographic office is the publication of charts, based on original surveys of distant coasts, by officers of our navy; but at present we take only a small part in this form of maritime exploration. During the past year, only one vessel has been engaged in such surveys. In unpleasant contrast with this, the review of hydrographic reconnoissances and surveys published annually in the English *Nautical magazine*, for example, shows how largely our ship-masters must depend on British charts in their voyages. The coast-survey does admirable work on our own seaboard; but, in addition to this, our government should take its proper share of the general hydrographic study of the world, commensurate with our wealth and maritime interests. New surveys of the northern coast of South America and of parts of the West Indies are urgently required, and their execution would be a well-chosen initial step towards the desired increase of our trade with the Spanish-Americans.

The collection of data for the physical study of the oceans is an important supplementary work of the same office; and by the recent establishment of its branches at six of our ports, intercourse has been greatly increased with ship-masters, from whom a large share of valuable material is obtained. The demand for the pilot chart of the North Atlantic (see *Science*, No. 69) has steadily increased; and some captains have even telegraphed from Europe, at their own expense, certain observations of special interest, made on the voyage across, for publication on it. The distribution of blank meteorological journals to voluntary observers has more than doubled during the past year; and ship-masters have been stimulated to make immediate report of inaccuracies of charts, and matter of all kinds pertinent to hydrography and cartography.

AMERICANS are often called upon to contribute toward memorial funds which are designed to honor distinguished Europeans. Among recent requests of this sort, we remember the subscriptions which were opened in honor of Berkeley, the early friend of education in this country; Tyndall the reformer; Charles Darwin; and the naturalists Balfour, Barrande, and Müller, — every one of whom is well worthy of high honor from Americans as well as from Europeans. Probably the amount which has been raised for all these commemorations is quite moderate, constituting no adequate expression of American sentiments, and no important part of the entire sum collected. The value of the gift is doubtless in the international or cosmopolitan aspect which it imparts to the memorial. But it is quite possible that each of these tributes has taxed some one in this country to a very considerable extent. Committees have been formed, circulars distributed, small sums collected, and a good deal of correspondence exchanged; and all this with very slight results. We raise the question whether it is worth while to make such efforts? Is the return worth the exertion? The truth is, in our opinion, that what force we can command in the direction of monuments ought to be expended in memorials to be retained in this country. Among secondary educational influences, monuments to great men hold a most important place. They not only honor the departed: they inspire the enthusiasm of youth, they encourage lofty emulations, they lead all classes to think about the men who have contributed to the advancement of our civilization.

We are only at the beginning of the monumental epoch in this country. Having honored

soldiers and statesmen for many decades, the Americans now seem ready to commemorate their literary and scientific heroes. John Harvard and Abraham Pierson, whose real likenesses perished long ago, have risen in bronze upon the greens at Cambridge and New Haven. The statues of Joseph Henry and Benjamin Silliman stand near the scenes of their activity. Examples like these should be imitated throughout the land. Those who have rendered great services to science and education should receive due recognition from those who have profited by their labors. Only let us pray to be spared such commonplace monuments as are to be seen in abundance in London. Let us rather study the memorial statues which have of late years been placed in the cities of Germany, Holland, France, and other continental countries. Better no monuments than those which give positive pain to the beholders, and which will some day be lowered, like the Iron Duke from his lofty arch, when taste and skill are more highly developed.

LETTERS TO THE EDITOR.

The oldest living type of vertebrates.

It is necessary to add a little to the discussion of Chlamydoselachus in order to give readers of *Science* a just idea of the case as it now stands. On hearing the evidence presented in my paper at the Philadelphia meeting of the American association, Professor Cope gracefully conceded that he had mistaken the affinities of Didymodus, and agreed with me in the conclusions that the two genera belonged to different orders, and that, judging from the teeth alone, the nearest known allies of Chlamydoselachus were Cladodonts of the subcarboniferous and middle Devonian. The shapes of the bodies of the extinct Cladodonts are yet unknown. What has been considered the closest approach to a determination of their skeletal structure is that of Dr. Traquair, based on the resemblance of a single, partly visible, and imperfect tooth of Ctenacanthus costellatus. Professor Gill has accepted the doctor's idea, and classified the sharks, fossil and recent, in accordance (*Science*, iii. 346). The lateral curvature near the apex of the tooth is rather against the determination, and the character of the base is not known. The weight of the evidence does not seem to favor the conclusion that Ctenacanthus is a Cladodont. The tooth resembles that of Rhina as much. Until we are tolerably certain in regard to the extinct (the unknown), it is about as well to assume that it in some degree resembled the recent (the known). In a revision of the arrangement of Gill, the Xenacanthini should be taken from his Lipospondyli to form a new order, the Cladodonts removed and placed with the Selachophichthyoidi, and the definitions revised in several cases to accord with structure. The result would appear thus:—

Xenacanthini, Pleuracanthus, Didymodus, and allies, prototypes of bony fishes.

Selachia. Galei.

1. *Lipospondyli*, including the true Hybodonts, but excluding the Cladodonts.
2. *Selachophichthyoidi*, including Chlamydoselachus and the Cladodonts, but excluding Didymodus; changing the definition from "vertebral condition unknown, and with teeth having fixed bases," to "vertebrae partially or imperfectly developed, notochord persistent, and teeth with broad backward expanded bases."
3. *Opistharthri*, the Notidanidae; changing the expression, "which alone exhibit these peculiarities in the existing fauna," to read, "which share many of their peculiarities with the preceding."
4. *Proarthri*, Heterodontidae.
5. *Mesarthri* (Anarthri Gill), most sharks; changing the statement, "palato-quadrate apparatus not articulated with the skull," to read, "pterygo-quadrate articulated or connected with the skull in the orbit by the trabecular elbow." The name 'Anarthri' is manifestly inappropriate, since few of the genera are without the articulation.
6. *Rhinae*, Rhinidae; changing the definition so that "with the palato-quadrate apparatus not articulated with the skull" shall read, "with the pterygo-quadrate articulated with the skull in the orbit by the trabecular elbow."

S. Garman.

Cambridge, Nov. 17.

Water of crystallization.

The first accompanying illustration (fig. 1) is taken from a photograph of plumes produced by the crystallization of water. In the appendix of Tyndall's work on light will be found an illustration (fig. 2) of the same phenomenon which is explained in the following letter from the late Professor Joseph Henry to Professor Tyndall.

Fig. 1.

"Accompanying this, I send you a photograph at the request of Prof. S. H. Lockett of the Louisiana state university, of which the following is his explanation:—

"'In my drawing-room I kept a wash-basin in which to rinse out the color from my water-color brushes.

This color gradually formed a uniform sediment of an indefinite tint over the bottom of the basin. On the night of the 26th of December last, which was an unusually cold one for this climate, the water in the basin froze. On the melting of the ice the next day, the beautiful figure you see on the photographs was left in the sediment. I carefully poured the water from the basin, let the sediment dry, and thus perfectly preserved the figure. It has been accurately photographed by an artist in this city. The negative is preserved; and, if you would like to have any more copies, they can readily be obtained.

"'We are not much accustomed, in this warm country of ours, to the beautiful 'forms of water;' and this has struck me as a little remarkable, and worthy of being kept.'

"The fact that the results have been produced by colored sediment indicates a method of exhibiting the effects of crystallization in an interesting manner."

Professor Tyndall refers to this as a 'surprising case of crystallization,' which it most certainly is.

Some years ago a glass-crystallizing dish was filled with Ohio-river water, which at certain stages carries in suspension a large quantity of yellow clay, and allowed to settle for several days, forming a thin yet firm deposit on the bottom of the dish. During a very cold night the water in the dish was frozen, and the sediment figured as herewith represented. The ice was melted, water removed, and the sediment dried. I have this remarkable specimen in my possession to-day, just as it was originally formed.

FIG. 2.

WM. L. DUDLEY.

Cincinnati, O.

An open polar sea.

In one of your September numbers (No. 86), there was a letter from Lieut. Ray on this subject, which, I think, needs some elucidation. Mr. Ray questions the existence of an open polar sea, on account of the low temperature of the water found by the last American polar expedition. What has the temperature of water to do with its greater or less freedom from ice in arctic climates? The temperature of maximum density of sea-water being lower than the freezing-point, the formation of sea-water ice is impeded, as the colder water is not the lighter. If, however, ice forms on sea-water, it is because, 1°, the specific gravity near the freezing-point differs much less (about one-third as much) from degree to degree than near 70°; so colder water has not so strong a tendency to arrange itself according to specific gravity as warm water, and may freeze, especially with cold winds from the land; 2°, at the close of summer the upper layers are generally much less salt than the lower, on account of the fresh water coming from melting ice, and from rivers swelled by the melting snow (this is especially the case in many inland seas of the northern hemisphere, and to a less degree in the southern hemisphere; such an arrangement of the waters allows the upper strata to be colder and yet lighter, and thus is very favorable to the formation of ice); 3°, after ice begins to form, it increases both from below, on account of the cold penetrating the ice, and from above, on account of the freezing of waves, spray, etc., on the surface of the ice.

Now, when the second condition, the most powerful (at least, for the beginning of the formation of sea-ice), is absent, or present only in a small degree, the conditions for the formation of field-ice or sea-ice are lacking, or only present on a small scale. This is more often the case in the high latitudes of the southern hemisphere than in the northern; because in the southern the seas are deeper and more open, and receive little river-water, the temperature of the air and sea is below the freezing-point to about 62° south, and the icebergs reach that latitude without melting.

If the north pole is surrounded by open, deep water, and if the temperature of summer there is lower than at the stations where observations have been made in the northern hemisphere (both suppositions will be granted as possible), there do not exist conditions so favorable for the formation of field-ice as on the north coast of Asia and North America, as there will be no brackish water of a low specific gravity near the surface. Thus there may be relatively open water near the north pole, not warm,

but cold; this only on the supposition of a deep, broad expanse of sea. If not, — if the pole is surrounded by a cluster of islands, like the archipelago of North America, — ice must predominate there, yet probably not so as to entirely exclude patches of open water, since these have been found everywhere in the Arctic.

Mr. Ray does not entertain the idea of a 'polar ice-cap,' — an idea which, unfortunately, lurks in so many heads that should know better (by ice-cap I mean one of great depth and permanence, formed on the open sea, not glacier ice). Mr. Ray's letter led me to look over the controversy on 'geological climates' in *Nature*, 1880–81. The polar ice-cap hypothesis was warmly advocated by Professor Samuel Haughton, who is, I think, considered an authority on this subject, at least in Great Britain. It was not abandoned by him, notwithstanding the strong arguments brought against it, especially by Mr. A. R. Wallace.

A. Woeikof.

St. Petersburg, Oct. 29.

Rhyssa not lignivorous.

In the record of the proceedings of the Brooklyn entomologial society, as reported in *Science* of Nov. 7, Mr. George Gade denies the parasitic nature of Rhyssa lunator, and states that it is a wood-feeder. This conclusion was indorsed by at least two other members of the society at the meeting of Sept. 27, and without any protest. The conclusion is quite erroneous; for not only does the whole organization of this genus of our largest ichneumon-flies point unmistakably to its parasitic nature, but there is plenty of evidence by competent observers on record to corroborate it.

Let me add, that I have had ocular evidence of the fact, as I have in a number of instances taken the Rhyssa larva of various ages and sizes, feeding upon the larva of Tremex columba. The Rhyssa does not sting and oviposit in its victim, however, as is generally supposed, but lays its egg anywhere in the Tremex burrow. The Rhyssa larva seeks its victim, and fastens to it from the outside, and thus develops, as do so many other parasitic larvae. This trait will account for Mr. Gade's observation upon which he based the erroneous conclusion.

C. V. Riley.

Washington, D.C.

Sky-glows.

Several letters in recent numbers of *Nature*, on 'sky-glows,' have reminded me of some observations made last summer during a trip across the Sierra Madre Mountains from Parral to Guadalupe y Calvo, in the state of Chihuahua, Mexico, which may be of interest to the readers of *Science*. The following account of the phenomenon is taken from my note-book under date of June 24, 1884: —

About nine o'clock this morning, as we neared the top of the mountain above San Estavan, at an elevation of 8,900 feet, Col. Matlock, my travelling companion, called attention to the remarkable dimness of the sunlight, suggesting the approach of rain or an eclipse of the sun, as no clouds were to be seen. On looking towards the sun, a peculiar pinkish glow, shading into purple, surrounded it, extending from fifteen to twenty degrees. The remainder of the sky presented a dark-blue, leaden color. The sunlight was so obscured as to give a peculiarly sharp outline to the shadows cast by the trees, and a weird appearance to the landscape. The glow continued throughout the day, which was perfectly clear with the exception of a few small fleecy clouds about noon, that flitted across the sky from the south-west.

We camped at Cuevas Blancas, on a small creek, a little before sunset, at an elevation, as indicated by a small aneroid barometer, of 9,190 feet. A huge rock, unfortunately, shut out the sun as it set; but on one side could be seen the new moon and two planets — Jupiter and Venus — shining with a bright silvery lustre through the pinkish hue of the sun-glow. As the twilight faded away, the color changed to a pale red. The sky at the time was perfectly clear, and the stars came out beautifully. According to my watch, the sun set at quarter-past seven o'clock, and the glow did not entirely disappear until half-past eight.

Wednesday, June 25; the same appearance of a pinkish or salmon-colored glow surrounded the sun as on yesterday, though the sunlight was apparently not so much obscured.

I may add, that a similar glow, though not so marked in appearance, was observed for a week or ten days thereafter. The rainy season, which usually begins in the mountains by the middle of June, had not commenced at the time; and, indeed, there was very little rain up to the last of July, when I left the mountains.

N. T. Lupton.

Vanderbilt university, Nov. 17.

Iroquois grammar.

The assumption of 'Reporter,' that the conclusions of my Montreal paper can affect the value of missionary work, except in illustrating its difficulties, I deny. My critic's own statement, however, that the life and force of the language depend upon the meaning of certain pronouns, and that these must conform strictly to a system of grammar already prescribed, or render the version erroneous, does throw aspersions upon many valuable works.

That the early French missionaries did influence the language of the western Mohawks is evident from their use of words coined by those old fathers; but the statement that their translations conform to those of the east is incorrect.

As the most perfect and complete grammar yet written in the Mohawk has been in my possession for over two years, it has been an easy task for me to find, upon ninety pages scattered throughout Brant's prayer-book, over two hundred instances where the pronouns do not follow the system there prescribed.

In comparing two translations of St. Mark, executed at different localities, we find still greater differences, not only in pronouns, but in the tenses, number, etc. In one of these translations we find that "they that did eat of the loaves were five thousand *warriors*," and, in the thirteenth chapter, that 'those days' which in that chapter refer to the future are translated in the past. These are only a few of the instances which might be given to show the difficulties of those pioneers. When my critic says that the supposition of Indians writing for Indians, and writing incorrectly, is 'inadmissible,' he is the one to cast an undeserved reflection upon the venerable missionary reviser of Brant's prayer-book, who has made numerous changes in these pronouns.

Through the kindness of French missionaries, I have had access to archives rarely or never opened before, have been permitted to bring to my own home their erudite researches, and I have not been so ungracious or ungrateful as to underrate either them, their work, or influence. I refer my friends to the paper read before the American association for the advancement of science at Minneapolis.

Confessedly now and forever a 'beginner,'

Erminnie A. Smith.

THE AGASSIZ ASSOCIATION.

THE benefit accruing to science from the humble work of those who endeavor faithfully to popularize its teachings is not always recognized by the investigator. Yet such work, though looked down upon by many not taking the trouble properly to inform themselves, is worthy of no doubtful recognition. An excellent example, perhaps second to none in this country for its success and beneficial results, is the founding and conduct of the Agassiz association, which held its first general assembly last summer in Philadelphia. The origin and plan of the association are the work of one man, Mr. Harlan H. Ballard. The society was first a local institution for youth at the Lenox (Mass.) academy, of which Mr. Ballard is principal. It proved so successful in promoting a love for the study of natural phenomena, that he conceived the idea of making the experiment more generally useful. An invitation to form a general association was answered with such unexpected enthusiasm, that over seven hundred local branches have now been established, and more than eight thousand children and grown people enrolled within four years. As the idea was in part suggested by the success of a similar society of boys and girls in Switzerland, the American association has been very appropriately named after Louis Agassiz, whose sympathy and earnest work in behalf of popular education has made his name historical in both Switzerland and America.

The association was originally planned for the benefit of the young. It was speedily ascertained, however, that its methods of encouraging study by out-door collecting, by subsequent talks, and by arranging exchanges with others, were much more effective stimulants than had been imagined; and other teachers besides the principal of Lenox academy found them useful in their schools.

By the regulations of the association, chapters may be established by a few persons, four being the minimum limit; and age having been wisely left out of account, many families have formed separate chapters. In some cases single persons of mature age, living in remote places, have found its advantages such that they have been admitted as correspondents. The voluntary labor of students in various departments has been secured, so that chapters and correspondents can obtain the information they need at first hand; and the extensive correspondence to effect this result has been conducted without charge by Mr. Ballard. By the co-operation of the editors of *St. Nicholas*, a monthly report is printed in that journal, without expense to the association. The magazine has thus become instrumental in helping to support the association, and deserves all the honor and credit won by such good offices.

Classes for the systematic study of elementary botany, entomology, anatomy, and physiology, have been formed under the leadership of competent teachers, and conducted by correspondence. Self-help and independent exertion are in this way made necessary for every isolated chapter, and this is systematically encouraged by all the influence of the leader of the association. Much good must have been already done in this way in direct opposition to the whole tendency of the ordinary training of the schools, and we are much mistaken if both pupils and teachers have not in many cases been greatly benefited by their experience in this really higher class of educational work.

We are told by the president, in his 'Handbook,' that the association is designed to be an extended free school of the natural sciences, open to persons of all ages and conditions. We cannot avoid a smile, however, when he adds that the association is intended to resemble the 'great school at Chautauqua;' for that school, with its large annual attendance and camp-meeting organization, is not one-tenth part so valuable to the intellectual interests of this country as either the Agassiz association or the somewhat similar 'Association for the promotion of home studies,' founded by Miss Ticknor of Boston. The conductors of these enterprises have done something permanent and effectual towards spreading a taste for

self-culture in an almost new sense, so far as the majority of people are concerned. They have shown that there is a practicable method by which the average intelligence and self-reliant character of the people outside of the schoolroom, as well as in it, can be effectively increased, and have taught thousands how to work with whatever means were at hand, not only for their own intellectual improvement, but for that of their children and neighbors. This must eventually affect the curriculum of the public schools through the creation of a demand for better and more natural methods of instruction. Indeed, if Mr. Ballard were to do nothing for the remainder of his life but carry on and perfect the system he has originated, and so extend the influence of his society, he could do nothing more desirable for the interests of science in this country, or more likely to secure future happiness and personal satisfaction for himself.

There is, however, in the path of this new organization, a certain danger arising from its necessarily intimate association with a publishing enterprise like that of *St. Nicholas*. Publishers and editors must do what will be profitable, and cannot afford too much philanthropy in their business. This spirit appears in the title, 'St. Nicholas Agassiz association,' as it stands upon the titlepage of the 'Handbook.' The incongruity of names offends good taste, and does not accord with the purely unselfish nature of the whole enterprise. There is also a real cause for apprehension in one clause of the constitution, which places the appointment of his successor in the hands of the president and the editors of the *St. Nicholas*. Most persons will translate it as having but one object, — that of securing to the publishers and editors, in the future, whatever advantages may flow from the prosperity of the society. However pardonable and strictly honorable this may be from a business point of view, it is not consistent with the scheme of the association, and will finally excite comment and dissatisfaction. It might have been necessary to confine the power of appointment and election in a society of children; but this association is no longer composed wholly of young persons, and has admitted large numbers of adults. The proprietors of *St. Nicholas* have a chance to lay the whole society under obligations of a kind which such bodies of people, in our experience, have never failed to recognize with gratitude and appropriate acknowledgments. We should earnestly advise them to take advantage of their opportunity.

THE 'POROROCA,' OR BORE, OF THE AMAZON.

While travelling upon the Amazon in 1881, I was fortunate in having an opportunity to observe some of the effects of a remarkable phenomenon which occurs at the northern *embouchure* of that river, in connection with the spring-tides. It is known to the Indians and Brazilians as the *pororóca*,[1] and is, I believe, generally supposed to be identical with the 'bore' of the Hugli branch of the Ganges, of the Brahmapootra, and of the Indus. I regret very much, that like Condamine,[2] who passed through this part of the country about 1740, I could not observe this phenomenon in actual operation; but the gentleman whose guest I was at the time, and upon whose boat I was a passenger, was fairly horrified at my suggesting such a thing, while his boatmen united in a fervent 'God forbid that we should ever see the *pororóca!*' and ever afterwards doubted my sanity. I venture, however, to give some of the results of my own observations, in order that those who in the future visit this region, concerning which so little is known, may be able to see, and establish as far as possible, the rate of destruction and building-up here being carried on.

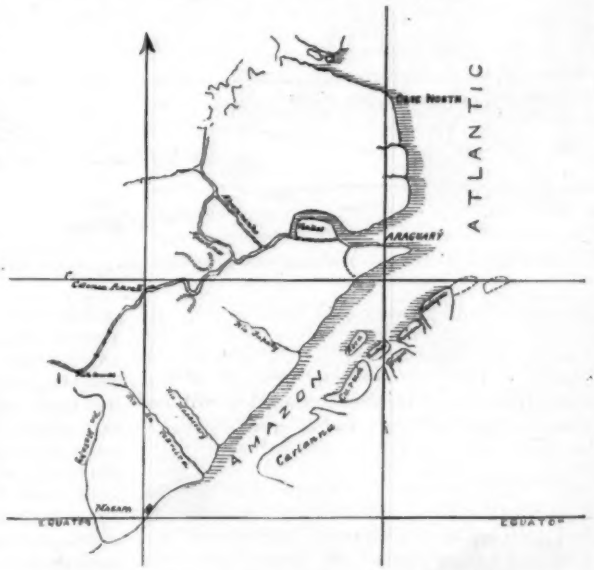
I was upon a trip from Macapa, — a small town on the northern bank of the Amazon, and about a hundred miles from its mouth, — down the river to the ocean, and thence up the Rio Araguarý as far as the last might be found navigable. The one inhabited place on the Araguarý is a military colony, called the Colonia Militar Pedro Segundo. At Macapá I became acquainted with the then director, Lieut. Pedro Alexandrino Tavares, and was invited by him to visit the Araguarý.

[1] This word, which is of Tupý or native Brazilian origin, is the one invariably used by the Brazilians. Father João Tavares says it is probably a frequentative form derived from the Tupý word *opoc*, which means 'to break with a noise.'

[2] Condamine was sent by the Royal academy of sciences, of France, to make astronomical observations in South America in 1735. His description of the *pororóca* is the one from which all references to it have been taken until now.

The trip from Macapá was by a small sail-boat down the Amazon to the ocean, and thence up the Araguaŕy. Our departure was so arranged that we could reach that part of the region disturbed by the *pororóca* exactly at the time when there would be the least probability of its being met with; that is, at the time of the neap-tides. The voyage down the river was in the face of the wind, and it was only five days after leaving Macapá that we put into an *igarapé* on the Island of Porquinhos to wait for the turning of the tide. I had already seen islands said to have been half washed away, and others built up, by the *pororóca;* and I had seen upon the shores the evidences of its destructive power in carrying away forests, and cutting away banks: but it was on this island that I was first able to see some of its effects near at hand, and at my leisure. After having seen so much, I was only the more anxious to see the *pororóca* itself; but my suggestions in regard to it were answered by an ominous silence on the part of the director, and my requests by additional expressions of horror.

As I shortly afterwards met and conversed with a man who had seen the *pororóca*, I shall first give his description of it, and then speak of its effects as observed by myself. This man was a soldier in the Brazilian army, and, on the occasion referred to, was going with a few other soldiers from the colony to Macapá in a small open boat. Arriving at the mouth of the Araguaŕy, they went down with the tide, and anchored just inside the bar which crosses the mouth of this stream, to await the turning of the tide, which would enable them to pass the shallows, and then carry them up the Amazon. Shortly after the tide had stopped running out, they saw something coming toward them from the ocean in a long white line, which grew bigger and whiter as it approached. Then there was a sound like the rumbling of distant thunder, which grew louder and louder as the white line came nearer, until it seemed as if the whole ocean had risen up, and was coming, charging and thundering down on them, boiling over the edge of this pile of water like an endless cataract, from four to seven metres high, that spread out across the whole eastern horizon. This was the *pororóca!* When they saw it coming, the crew became utterly demoralized, and fell to crying and praying in the bottom of the boat, expecting that it would certainly be dashed to pieces, and they themselves drowned. The pilot, however, had the presence of mind to heave anchor before the wall of waters struck them; and, when it did strike, they were first pitched violently forward, and then lifted, and left rolling and tossing like a cork on the sea it left behind, the boat nearly filled with water. But

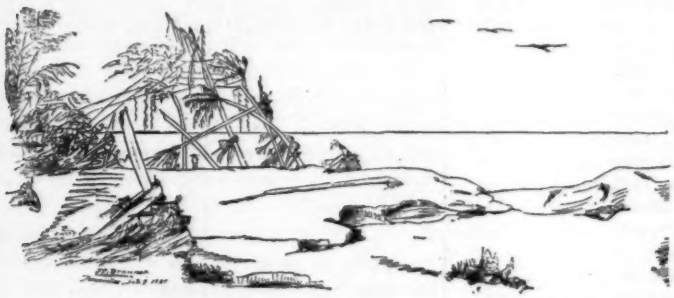


MOUTH OF THE AMAZON. SKETCH-MAP OF THE PART PRINCIPALLY AFFECTED BY THE POROROCA, BY J. C. BRANNER.

their trouble was not yet ended; for, before they had emptied the boat, two other such seas came down on them at short intervals, tossing them in the same manner, and finally leaving them within a stone's throw of the river-bank, where another such wave would have dashed them upon the shore. They had been anchored near the middle of the stream before the waves struck them, and the stream at this place is several miles wide.

But no description of this disturbance of the water can impress one so vividly as the signs of devastation seen upon the land. The silent story of the uprooted trees that lie matted and tangled and twisted together upon the shore, sometimes half buried in the sand, as

if they had been nothing more than so many strings or bits of paper, is deeply impressive. Forests so dense that I do not know how to convey an adequate idea of their density and gloom, are uprooted, torn, and swept away like chaff; and, after the full force of the waves is broken, they sweep on inland, leaving the *débris* with which they are loaded, heaped and strewn through the forests. The most powerful roots of the largest trees cannot withstand



SKETCH ON THE ILHA DOS PORQUINHOS, SHOWING THE UPROOTED TREES.

the *pororóca*, for the ground itself is torn up to great depths in many places, and carried away by the flood to make bars, add to old islands, or build up new ones. Before seeing these evidences of its devastation, I had heard what I considered very extravagant stories of the destructive power of the *pororóca;* but, after seeing them, doubt was no longer possible. The lower or northern ends of the islands of Bailique and Porquinhos seemed to feel the force of the waves at the time of my visit more than any of the other islands on the south-east side of the river; while on the northern side the forest was wrecked, and the banks washed out far above Ilha Nova.

The explanation of this phenomenon, as given by Condamine, appears to be the correct one; that is, that it is due to the incoming tides meeting resistance, in the form of immense sand-bars in some places, and narrow channels in others.

Most persons who mention the *pororóca*, say that it breaks as far up the Amazon as Macapá; and, indeed, the people of Macapá themselves often refer to the rapid cutting-away of the river-banks near their city as the work of the *pororóca*. It is true that these banks are being rapidly cut down; and it is even a common thing to see, in this part of the country, the stilted houses — the floors being nearly two metres from the ground — that were originally built one, two, or three hundred feet from the water, gradually encroached upon until they fall into the stream. A portion of the old fort at Macapá was, at the time of my visit, about to fall, on account of the land upon which it was built being washed away; but all this is the work of a rapid current, for the surf of the *pororóca* does not reach Macapá, though it may reach a little farther west than I have represented on the map. Moreover, there is a marked difference in character between the washing done by the *pororóca* and that done by the ordinary river or tide current. The latter works from below, and, by undermining and softening the bank, causes what is known through the Amazon valley as *terras cahidas*, or fallen banks. The land falls into the stream in sections of various widths, and not infrequently these form temporary terraces miles in length. These *terras cahidas* are most common and most extensive on the upper Amazon during high water, but they may be seen on a small scale at various places through the valley. The accompanying diagram and sketch were made near Mazagão, on the lower Amazon. From this it is clear that the work of destruction goes on entirely below the surface. With the *pororóca*, on the contrary, the water is dashed fairly against the banks, and the earth is washed away from above as well as from below, and the shore is left perfectly clean. The depth to

SECTION OF A FALLING BANK ON THE AMAZON.

which the banks are cut shows that this disturbance is also a profound one; so much so, indeed, that on the north-west side of Porquinhos the deepest place in the channel of the river was, in 1881, close to this island, where the action of the *pororóca* was most violent.

All through this region the *pororóca* is largely instrumental in the rapid and marked changes that are constantly going on. The water of the Amazon is notoriously muddy; and, as would naturally be expected, these disturbances in comparatively shallow places make it much more so, and fill it with all the sediment it can possibly carry. Even when I entered the Araguarý, a time when there was the least possible tidal disturbance, the water near the mouth of this stream was so muddy, that a thick sediment would settle in the bottom of a vessel of it left standing a single minute; though the water of the Araguarý proper, as far down as the Veados, is of a clear,

SHORE 2 M. HIGH, WASHED BY THE POROROCA, FORMERLY COVERED WITH FOREST.

dark color. But the work of tearing down and that of building up are equally rapid, and the vegetable world takes quick possession of what the sea offers it; and, while some islands are being torn away, others are being built up, old channels being filled, islands joined to the mainland, and promontories built out. To the northwest of Faustinho is an island known as the Ilha Nova ('new island'), about ten miles long by about three wide, when I saw it, and which, I was assured by several trustworthy persons, did not exist six years before. In 1881 it was covered by a dense forest. The young plants were sprouting at the water's edge, those behind a little taller, and so on; so that the vegetation sloped upward and back to a forest from twenty to thirty metres high in the middle of the island.[1] Again: on the southern side of the mouth of the Araguarý was a point of land nearly or quite six miles in length, and covered with vegetation, from young shoots to bushes six metres high. I was told, that, one year before, this was nothing more than a sandbar, without a sign of vegetation on it. The western end of the Island of Porquinhos was once known as Ilha Franco; but the channel that separated it from the Porquinhos has been filled up gradually, and the two islands are now one, though the upper end of it is still known as Franco. The point in the mouth of the Araguarý known as the Ilha dos Veados ('deer island') was, at the time of my visit, fast being joined to the mainland. A couple of years before, boats navigating the Araguarý passed through the channel on the south side of the island. In 1881 it was no longer navigable, and the Veados was rapidly being made part of the right bank of the river.

Owing to this shifting of material, the pilots never know where to find the entrance to the Araguarý River. One week the channel may be two fathoms deep on the north side, and the next it may be in the middle; or it may have disappeared altogether, leaving the riverbed perfectly flat, with only one fathom of water across the whole mouth. The bar was in this last-mentioned condition when I passed over it in 1881. At this time another bar extended eastward from the eastern end of Bailique; while a little farther out was another just south of the same line, as I have indicated on the map. The shifting nature of the sandbars about the mouth of the Araguarý renders it unsafe for vessels drawing more than one fathom to enter this river, except at high tides. But, as high tides and the *pororóca* come at the same time, only light-draught steamers can enter by waiting well outside the bar until the force of the *pororóca* is spent.

With the few canoes or small sailing-vessels that enter this stream (probably less than half a dozen a year), it is the custom to come down past Bailique with the outgoing tide, and to anchor north of the bar that projects from the southern side of the Araguarý, and there to await the turn of the tide to ascend the latter river. Care is always taken to pass this point when the tides are least perceptible.

Although the *pororóca* breaks as far up the Araguarý as midway between the Veados and the entrance to the Apureminho, its violence seems to be checked by the narrowing of the stream below the Veados, by the turns in the river, and by the vegetation along the banks.

This vegetation is of the kind against which it seems to be least effective, namely, bamboos. They grow next the stream from near the mouth to the foot of the falls above the colony, and form a fringe to the heavy, majestic forest behind them, than which nothing could be more strikingly beautiful. The clusters next the stream droop over till their graceful plumes touch the surface of the water; and, as the plants grow older, they droop lower, until the stream is filled with a yielding mesh of canes. I measured a number of these bamboos; and the longer ones, taken at random, were from twenty to twenty-five metres in length, and from seven to ten centimetres in diameter. A more effectual protection against the *pororóca* could hardly be devised.

[1] The plants growing upon this newly formed land are all of one kind. They are called *Ciriúba*, or *Xiriúba*, by the inhabitants, and belong to the family Verbenaceæ, genus Avicennia.

On Bailique and Brigue I found the forests very different from any I had hitherto seen in the tropics. These islands, like all the others in this part of the country, are flooded at high tide during part of the year; and, as a consequence, they are very like great banks of mud covered with the rankest kind of vegetation. This vegetation varies with the locality. All around the borders, Brigue is fringed with tall assai palms, bamboos, and various kinds of tall trees, all of which are hung with a dense drapery of sipós (lianes) and vines, which form an almost impenetrable covering. Inside of this are several palms, the most common being the ubussú (Manicaria saccifera). The next in order are the murumurú (Astrocaryum murumurú), urucurý (Attelea excelsa, the nut of which is used for smoking rubber), and ubim (Geonoma). But, unlike most tropical forests, this one has very little or no undergrowth, except upon the borders. Most of the ground was under from one to six inches of water, while the exposed places were covered with fine sediment deposited by the standing muddy waters of the Amazon. I walked several miles through this forest without finding any palms except the ones mentioned. The little ground above water was covered with the tracks of deer, pácas, cutías, and of many kinds of birds, mostly waders; but the deathlike stillness was unbroken, save for the little crabs that climbed vacantly about the fallen palm-leaves, or fished idly in the mud for a living.

This vast expanse of muddy water, bearing out into the ocean immense quantities of sediment; the *pororóca*, breaking so violently on the shores, and carrying away the coarser material to the open sea, and burying uprooted forests beneath newly formed land; the rank vegetation of islands and *varzea* rapidly growing and as rapidly decaying in this most humid of climates; the whole country, submerged for a considerable part of the year by the floods of the Amazon, — impress one with the probability of such phenomena having been in past ages, and still being, geological agents worthy of study and consideration. Across the mouth of the Amazon, a distance of two hundred miles, and for four hundred miles out at sea, and swept northward by ocean-currents, beds of sandstone and shale are being rapidly deposited from material, some of which is transported all the way from the Andes, while in many places dense tropical forests are being slowly buried beneath the fine sediment thrown down by the muddy waters of the great river.

John C. Branner.

Geological survey of Pennsylvania, Scranton, Penn.

HISTORY OF ALMANACS.

The derivation of our English word 'almanac' seems doubtful. The word possibly came from *almonaght*, Saxon words meaning 'the observation of all the moons.' In Roman times the priests announced once a month to the people what days should be observed as holidays, basing their calculation upon the movements of the moon. In this way almanacs arose to give information of church feasts. Then superstition entered, and caused an interest to be taken in the movements of the planets. As the earth was held to be the centre around which moved the moon, the planets, and the stars, and as the moon was seen to have an influence upon the tides, the inference was drawn that human affairs could but be affected by these outside bodies which were supposed to have been created for the benefit of the world alone.

The earliest calendars known were cut upon rods of wood or metal, some of the Roman calendars on blocks of stone. The earliest written almanacs were of two classes, — the first containing astronomical computations; and the other, lists of saints' days, and other matters pertaining to the church. Both are sometimes found united; although the latter claimed greater antiquity, being prefixed to most ancient Latin manuscripts of the Scriptures. We reproduce from the 'Glossaire archéologique' of Victor Gay a church calendar of the fourteenth century, in which the leaves are made of box-wood, the pages reproduced giving the calendars of January and December. The first printed calendar was issued in 1472, by Johannes de Monte-Regio; and before the end of that century they became common on the continent. In England they were not in general use until the middle of the sixteenth century; and the making of calendars interested the best mathematicians of the time, which was not the case a little later.

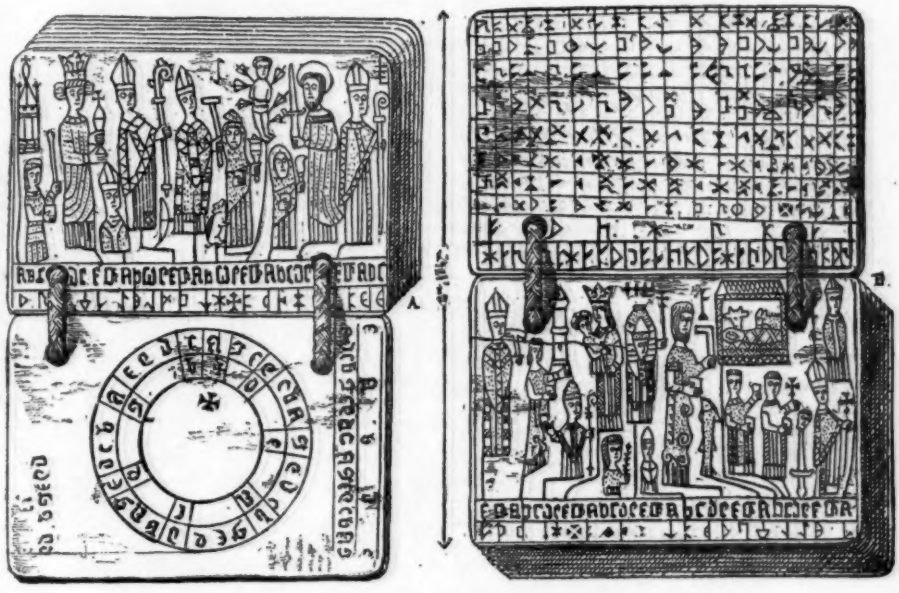
From the earliest times, calendars were filled with advice to physicians and the farmer: the farmer is told when to plant, and the sick man when to take physic. We quote here from an almanac published in 1628, in London, by Daniel Brown, — "Willer to the Mathematickes, and teacher of Arithmeticke, and Geometry," — the titlepage of which bears the inscription, 'Astra regunt homines et regit astra deus,' the paragraphs on

"*Judiciall Astronomy.*

"It hath beene an order and a custome (amongst the most excellentest and wisest Physitions, to choose the Moone for the principall. Significatrix of the sicke Person, and according unto her motion, situation, and configuration (with other Planets) haue giuen judgement on the increasing, mittigation and alteration of the disease; which of the Physition is called Crisis, that is a swift and vehement motion of a disease, either to life or death, and it hapneth about the supreame intention of a disease. And Galen (in commento de diebus Criticis) sayth. A Physition must take heed and advise himselfe of a certaine thing that faileth not neither deceiveth,

which the Astronomers of Egypt taught) that is to say when the body of the Moone is joyned with fortunate Plannets and Starres, dreadfull and fearefull sicknesse commeth to good end. And therefore the expert in that excellent science of Physicke, doth obserue and marke how the Moone passeth through the Zodiacke; and with what Planets she is joyned; thereof they do vnderstand much of the alteration of the sicknesses, for the Moone with the good Planets, as Iupiter and Venus, or aspected well of them tendeth to good. Contrarywise with the euill Planets as Saturne and Mars, or euill aspected of them, doth pronounce and cause euill essence of the sickenesse, in so muth that such dayes in euery moneth is to be accounted more dangerous then the rest to fall sick causeth the mutability and alteration of mens bodies, to bee good or euil, according to the nature of that Planet with whom she is adjoyned, which agreeth to the saying of Ptololeus in the 16. Aphorisme of his Centi loquio. Behold the motion of the Moone as she passeth through the Criticall, Judicial and mortall dayes, for if she be in them fortunate, it will fall out well: if Unfortunate, the contrary. And by the censure of the great. Astrologicall and Theologicall Doctor Frauncis Iunctinus, that by the motion of the Moone and Planets are knowne the Criticall and dangerous dayes, when the sicknesse will bee more remisse and placable. And when it is convenient to vse outward, or inward medicines.

"Concerning cautions in ministration in Physicke,



A CHURCH CALENDAR OF THE FOURTEENTH CENTURY.

in. Which dayes I have noted in my Almanacke, with their Characters, under the Aspects of Luna to Saturne and Mars. Thus a ☌ Conjunction, this a □ Quartile, this a ☍ Opposition: For example, The 5. day of Aprill, the ☌ of Saturne and Luna the Moone, being in Virgo of ♄ afflicted, the griefe shall proceede of viscuous and tough fleame. The thirteenth of Aprill the ☍ of Mars and Luna, the Moone being in ♑ of ♂. afflicted, the griefe is of blood and red choller. For Astrologers say, that among all the other Planets the Moone (in ruling) hath most power and mastry of mens bodies. Ptolomeus saith, under the moone is contained sicknesse, therefore about the alteration of mans body, the Moone worketh principaly; and because her orbe is neerest to the earth, sendeth vs the vertue and impression of the other Planets; and as purgations, laxatiue, or phlebotomie, seeing the fore sight, and preuention of such especially appertaineth to the learned in Physicke, wherein they can helpe themselues, and others, God giuing a blessing to their practise, for of the most high commeth healing. I commit them to the consideration of the learned, in that excellent Science of Physicke and Chyrurgery."

Prognostications of the weather were also called for by the readers of almanacs; and the following rules, quoted from a manuscript in Lambeth palace, as given by Mr. Halliwell-Phillips, may be of service to those whose faith in the moon is still strong, and who may wish "to knowe what wether shall be all the yere after the chaunge of every moone by prime dayes."

"Sondaye pryme, drye wether.
Mondaye pryme, moyst wether.
Teusdaye pryme, cold and wynde.
Wenesdaye pryme, mervelous.
Thursdaye pryme, Sonne and clere.
Frydaye pryme, fayre and fowle.
Saturdaye pryme, rayne."

It will be seen that superstition has largely entered in keeping alive the interest in almanacs. The first object in their publication was that men might save their souls by knowing their church days; and the second, that they might sow their seed and take their physic to the best advantage. Of course, all this wisdom of our greatest grandfathers was often scoffed at by the unbelievers; but it will probably be found, that, even at the present day, the most constant users of the almanac are those who thumb them over with the expectation of finding similar guidance. When criticised, they reply that it is just as well to be on the safe side.

One of the earliest American almanacs, which also served as an altar upon which to offer human sacrifices, and which has given rise to such lively discussion among the antiquarians, was the Mexican calendar-stone.

THE MEXICAN CALENDAR-STONE.

The Mexican year was a solar year of three hundred and sixty-five days. Their old calendar consisted of three hundred and sixty days, to which they finally added five. Each day had a name except the added five. The year was divided into two parts, — one of two hundred and sixty days, called *mezlli pohualli* or 'moon-reckoning;' and a smaller portion of a hun

dred or a hundred and five days, called *tonal pohualli*. The year was divided into eighteen months of twenty days each: the five extra days were looked upon as outcasts and unlucky days. The week was only five days long. Further, they recognized a cycle of fifty-two years, each of which had a name, and during the last night of any one of which the world might come to an end.

On the Mexican calendar-stone the sun-god is represented in the middle, and surrounding him the symbols of the sixteen hours of the day. The four larger pointers indicate sunrise, mid-day, sunset, and midnight. The subdivisions of eight hours are marked by the smaller pointers, while the sixteen hours are indicated by the small towers at the corresponding distances. In the narrow belt surrounding the central shield are found the symbols for the twenty Mexican months, beginning at the left of the centre at the top, and running round contrary to the hands of a watch. The first is named *Cipac*, for the astronomer who added the five days to the year; the second is called *ehecatl* ('wind'); and the third, *calli* ('house'), showing a Mexican house with flat roof. Surrounding this is a narrow zone of squares, each containing five points divided into four lots of ten squares each, which gives two hundred dots. There are lacking sixty dots to make up the larger subdivision of the year; and it will be noticed that the space for these is exactly occupied by the pointers, the lines across the pointers indicating that the zones are supposed to be continued under them. The other division of the year contains a hundred and five days as represented by the zone of glyphs just outside the zone of dots, and it will be found to contain a hundred. The missing five are seen directly under the sun's face. There only remains the representation of the fifty-two years cycle, and this is found in the outer belt. Every fifty-two years the sacred fire was rekindled, the ceremony beginning with human sacrifices, and ending by the rekindling of the fire by rubbing a stick in a hollow piece of wood. This rekindling is symbolized in each of the figures of the outer belt. The vertical column represents the stick, and the flames are seen rising at either side. The belt just within this outer one symbolizes the destruction of the world by rain, being a rough representation of clouds, with four streams of rain descending from each. The Mexicans had a tradition of four destructions of the earth, — one by war, symbolized by the tiger's head above the sun at the right; another by wind; another by rain; and the fourth by great flood. The four squares around the sun-head are supposed to symbolize these epochs. The antiquarian would


BICKERSTAFF'S
BOSTON
ALMANACK,
For the Year of our REDEMPTION,
1785.
Being the First after Leap-Year and Ninth of American INDEPENDENCY. Fitted for the Meridian of BOSTON, Lat. 42° 25° N.

BOSTON: Printed and Sold by E. Russell, next Door to Liberty-pole, by Wholesale or Retail, cheap. George's Almanack is in the press.

THIRD EDITION.

deduce valuable facts with regard to Mexican history from the stone; but for further details we must refer to the lecture of Dr. Valentini, published by the American antiquarian society.

The first book printed in Cambridge, Mass., was an almanac, that the wise men of New England might not lead unguided lives; but no copy of the book is known to exist. We give, however, the title-page of an almanac published in 1785 in Boston, which shows the maker taking the altitude of a star with a cross-stick, which is nothing more than a cross-piece sliding upon a graduated stick, the observer bringing one end of the cross-piece on a line with his eye and the horizon, and the other end on a line with his eye and the star.

Almanacs contained considerable trashy information up to the early part of this century, when the British almanac and companion were published in 1827. The British almanac aimed to give a reliable calendar, and a vast amount of information which is generally hidden in census reports. It has been followed by Whitaker, giving similar information for the whole world, and by the American almanac, more especially devoted to American affairs. So it will be seen that the almanac first gave rules by which one might know every thing, and ended by telling us every thing we know.

EXPLORATION OF PUTNAM RIVER, ALASKA.

The Ounalaska (Lieut. G. M. Stoney, U.S.N., commanding) arrived in San Francisco, Oct. 25, having completed the exploration of Putnam River so far as the time allotted would permit. The river was explored by a steam-launch three hundred miles, when rapids were encountered; then a canoe was taken, and towed by hand about eighty miles farther; and from this point a short portage brought a portion of the party to the head waters of one of the northern tributaries, which was fed by two large lakes. A mountain near one of these lakes furnished a view far to the eastward, up the main valley of Putnam River, and showed it flowing in undiminished volume as far as the eye could reach. The natives reported, that seven days' journey farther up the river there was a great lake, looking like a sea; and it is thought that this is the source of the river. There is little doubt that the river has its origin as far east as the British possessions, and probably near to the Mackenzie.

Putnam River empties into Hotham Inlet just north of Selawik Lake and to the south-east of Kunatuk River. There is a large delta at its mouth stretching back about forty miles, which is pierced by over one hundred channels, one of which is about one mile in width. The river is navigable to boats drawing from five to six feet of water, up to the rapids. Here the water flows at about ten knots per hour. The river and most of its tributaries lie within the arctic circle. Most of the tributaries are from the north, and they are generally shallow but rapid-flowing, while the water is very cold; in some instances the observed temperature being 38°, while in one case it was 33°. Only one considerable branch was found flowing from the southward. This is called the Pah River by the natives, and it is used by them in journeying to the south; for a very short portage from its source enables them to reach one of the northern tributaries of the Yukon River, and they are thus brought in easy communication with the trading-posts. It is believed that like easy portage can be made from the Putnam to the river discovered by Lieut. Ray near Point Barrow, and which empties into the Arctic Ocean.

The country about the Putnam is mountainous. Long ranges extend along either side; but they are peculiar in existing in small, detached groups, each of which possesses distinguishing characteristics, some being clearly defined, sharp, rocky peaks, while others are smoothly rounded. The higher ones are estimated at about three thousand feet. From the tops of those which were ascended, the whole country to the north appeared to be a confused mass of mountain peaks, and the natives stated that the country was of the same character to the Arctic Ocean.

The country explored was found to possess a warm and agreeable summer climate, the thermometer having reached 115° in the sun, while the nights were cool. The valley of the Putnam is heavily timbered with spruce, birch, cottonwood, larch, and willow; while flowers were in abundance, roses being seen in large numbers. Cuttings of these latter, together with specimens of coal, gold, and copper, and a huge fossil trunk, form a part of the material collected for the Smithsonian institution.

While Lieut. Stoney was absent, Ensign Purcell remained with two men in charge of the schooner, and made a survey of Hotham Inlet and the Selawik. He found that the Selawik River represented on the charts has no existence; but there is a channel, six miles in length, connecting Selawik Lake with a chain of three lakes to the eastward. He also found a five-fathom channel over the Hotham-inlet bar.

The Ounalaska is a fifty-four ton schooner, and Lieut. Stoney was provided with two officers and a crew of eight men. There were no naturalists with the expedition.

While returning from his expedition, Lieut. Stoney encountered several severe gales. During one of the most severe he employed oil for stilling the waves, with marked success. The oil was rigged upon a spar to which a drag was attached, and the vessel was so manœuvred that the drag stood off the weather-bow. The vessel holding the oil was so constructed that the oil was forced out in portions by each advancing wave. All the waves were affected by the oil, but the great foaming combers most markedly.

THE BIRD-COLLECTION OF THE U.S. NATIONAL MUSEUM.

In the register of specimens belonging to the bird department of the National museum, which records

the complete known data of every specimen received, the number 100,000 has been passed.

This collection is by far the most complete of any, in the representation of North-American birds and those of the West Indies; while, of South and Central American birds, only two collections — those of Dr. P. L. Sclater and Messrs. Salvin and Godman in England — excel it. These are superior in the number of species represented, but are decidedly inferior as regards the number of specimens; the aim of the museum being to acquire series which will illustrate the important subjects of geographical distribution and variation, thus furnishing material for those investigating the higher branches of the science. In Australian, Japanese, and European birds the collection is also tolerably complete; but of African, Asiatic, Indo-Malayan, and Polynesian species, there are still many important deficiencies. These, however, are being rapidly filled by exchange and otherwise, so that a fair collection of old-world birds is only a question of time. It may be explained, with regard to exotic birds, that the chief aim of the museum is to acquire representatives of, first, the higher groups not represented in the American fauna; second, genera and species allied to American forms; and, third, typical species of the more distinct genera within each family.

The extensive and unique collection of birds now possessed by the museum has grown from the private collection of Professor Baird, consisting of three thousand six hundred and ninety-six specimens, mostly collected, prepared, and labelled by Professor Baird and his brother, William M. Baird, from 1839 to 1851, but embracing also many, if not most, of the types of Audubon's works, presented to Professor Baird by Mr. Audubon. The catalogue of this collection, in Professor Baird's handwriting, forms volume i. of the museum registers of the bird-collection, which now comprises eighteen volumes, containing a full record of every specimen. In the case of specimens which are the parents of eggs collected, the museum register number of the latter is given in a particular column; while in the egg register the number of the parent, if in the collection, is given in a corresponding place.

The great bulk of this collection is in the form of unmounted skins, arranged in insect-tight drawers, the contents of which are, as far as practicable, marked on the outside; the arrangement being so systematic that any specimen in the entire collection can be readily found within five minutes of the time it is called for. The number of specimens in the mounted or exhibition collection is, for several reasons, necessarily small. In the first place, the cases available for their exhibition are in every way unsuitable, being old and badly constructed, admitting freely both dust and insects, thus rendering it a great risk to put valuable specimens inside of them. Were suitable cases provided, the number of specimens which the public could view might easily be increased from six thousand (the number, approximately, now on exhibition) to fifteen thousand or more, without materially weakening the 'study series,' or putting in the cases specimens of no interest to the general public.

Labels designed with special reference to the needs of the non-scientific public are being prepared for the mounted specimens, and will be attached to them as soon as possible.

Ornithologists will rejoice that Professor Baird has lived to see the gradual development of a grand national collection from the humble nucleus upon which it was built. The pleasant associations which his memory, no doubt, recalls, must be no less a source of happiness to him than the opportunity of witnessing the important and far-reaching results of his boyhood studies. All wish for him the satisfaction of realizing the consummation of the plans conceived during his maturer years, not the least of which, perhaps, may be the perfection of a national establishment for the study of natural history, which shall be alike attractive and instructive to the general public, and accessible to the special investigator, under the auspices of a government which should take pride in fostering and maintaining a natural-history museum such as no other country can boast.

As being more than any living person entitled to the privilege, specimens numbered 100,000 closing the first century of thousand, and 100,001 commencing the second, are entered as donations from Professor Baird. They were collected in 1850, and presented to Professor Baird by Mr. George N. Lawrence of New-York City, to whom belongs the honor of being the oldest active American ornithologist, and an associate of Professor Baird in his classical work on North-American birds published in 1858.

ROBERT RIDGWAY.

OVER-PRESSURE IN SCHOOLS.

THE subject of over-pressure in schools is being seriously agitated in many European states. In England the discussion just now is related to the report of Dr. Crichton-Browne upon over-pressure in the Board schools of London. This gentleman was invited by Mr. Mundella to examine the schools from his stand-point as a medical expert, and report his observations and conclusions as to the effect of the system upon the health of the scholars. As eventually issued by the education department, the report is accompanied by a memorandum from the pen of Mr. F. G. Fitch (one of her Majesty's inspectors), who severely criticises Dr. Browne's method of investigation, his arguments and conclusions. The press has entered upon the controversy with considerable ardor, so that over-pressure and Dr. Crichton-Browne are topics of the day.

The characteristic features of the English Board school system, the rigid arrangement of subjects and standards, the government inspection, the complicated scheme of examinations, and the payment by results, are unlike any thing that is known, or that would be tolerated, in America; nevertheless, the two systems have certain tendencies in common. In both, the animating impulse of the schools is derived

largely from the standard by which the results are periodically estimated, which standard is an *a priori* conception of the powers and capacities of the young. This is not the only, and possibly not the best, means of estimating a process of growth; but it is the only one encouraged under the English code, and the only one that is likely to be employed among us, so long as the majority of parents demand, not that their children shall grow, but that they shall overtake some one else's children in the race.

Wherever an artificial stimulus is employed, there will be over-pressure to a greater or less extent; and it is this fact which Dr. Crichton-Browne has brought out most effectively. The backward children, whom he judges to be incapable of accomplishing an ordinary year's work without undue strain, include the dull, the delicate, and the half-starved. In this country the last-named class are virtually outside the operation of the influences that produce over-pressure; but of dull and delicate children we have a full quota, and it is well for parents to consider the risk that attends the endeavor to force such to keep pace with those whom 'God has made full-limbed and tall.'

It is difficult to establish a relation between educational processes and vital statistics; but there is reason to infer the connection, whenever, as Dr. Browne expresses it, "diseases due to nervous conditions, identical with those that educational over-pressure sets up," are on the increase. That this is the case in England is shown, Dr. Browne believes, by the statistics of mortality from hydrocephalus, cephalitis, diabetes, and kindred diseases. Nor does he stop here. "We have signs," he says, "which can scarcely be misinterpreted, of the tendency of education, when not safe-guarded by physiological discretion, to overthrow mental equilibrium. Suicide, which is the crowning symptom of one type of insanity, has been spreading portentously during the last hundred years. A startling revival of it has occurred all over Europe; and the rate of suicide calculated on the entire population seems to have quintupled in the last century. It is," he says further, "an indisputable fact, that the revival of suicide in almost every country of Europe has coincided in time with the modern extension of education, and that suicides are now most numerous in the very regions where education is most widely diffused. The number of children under sixteen years of age in the list of suicides, although still comparatively small, is swelling annually; and the age at which the maximum number of suicides occurs in England has receded considerably in the last half-century, showing that the disposition to self-destruction arises now earlier in life than it was wont to do in former times."

Dr. Browne's personal investigations in the schools were directed to ascertaining the extent of headache, sleeplessness, neuralgia, etc., among school-children. It is sufficient to note the line of inquiry, without going into the tabulated results, more especially as the author admits that they are merely tentative.

Attention has already been drawn in the pages of *Science* to the action taken by several German states with reference to overwork in the Gymnasien and Realschulen. More recently, in accordance with the commands of the Prussian minister of instruction, a report on the subject has been prepared by the 'Royal scientific commission on medical affairs,' including Professors Virchow and Hofmann, and ten other members of almost equal note. The commissioners go into a detailed discussion of the observations submitted to them by the government, touching suicide and insanity among scholars, headache, bleeding at the nose, congestion of the brain, and general physical and mental weakness. In view of all the information attainable, they state "that the requisite data are wanting for a scientific estimate of the extent of over-pressure among the pupils in higher schools;" and they express the opinion, that, for the collection of such data, "the co-operation of competent medical men is indispensable." They do not, however, overlook the fact that there are many essential points involved in the inquiry, of which the teachers alone are the proper judges. The commissioners especially insist that teachers must not measure the strength of their scholars all by the same standard.

The agitation of the subject of over-pressure is not confined to England and Germany. Information reaches us that the minister of public instruction in France has reduced the hours of study in secondary schools. In Switzerland, where the evidences of over-pressure are startling, the cantonal governments are considering the best means of counteracting the evil. At the recent international medical congress, Copenhagen, Dr. Kjellberg of Upsala made a profound impression by his statements concerning the effect of study upon the health of children. The symptoms of excessive brain-work on the part of the young, which he had noticed, were headache, sleeplessness, intellectual torpor, muscular weakness, and spasm, culminating in hallucination, and often in sudden loss of consciousness.

Little or no effort has been made in the United States to collect data bearing upon the subject, but there is reason for supposing that over-pressure is not so common here as in countries where education is more highly developed. It would, however, be well for us to take warning in time, and seek to forestall such effects as those described by the various experts who have investigated the matter in Europe. We should be particularly cautious about advocating European systems of education before we have ascertained their ultimate effects.

NEW-ENGLAND ORCHIDS.

The orchids of New England: a popular monograph. By Henry Baldwin. New York, *Wiley*, 1884. 158 p., illustr. 8°.

Lovers of flowers have always wondered at and admired the beauty and oddity of orchids, which are sure to form the most interesting

part of a collection of exotics; but since the reason for their many strange and complicated forms was set forth by Mr. Darwin, in his work on their fertilization, the name 'orchid' at once suggests a plant worthy of more careful study. While we do not have Angraecum, Pterostylis, or Catasetum among our wild plants, to indicate the extreme adaptation to insect-pollination of which the family is capable, our flora contains many species quite as interesting to the student as those to be seen in most collections; and Mr. Baldwin has done very good service in collecting the scattered notes on their peculiarities. Of the fifty-nine species or well-marked varieties of our eastern flora, no less than forty-seven are found in New England; so that the book is of more than local interest. With few exceptions, the sixty illustrations, the larger ones mostly from nature, are very good; some are excellent, and show not only a botanist's knowledge, but an artist's appreciation of light and shade and of the value of a well-selected background. The writer's style is pleasing; and, if the professional botanist might feel disposed at times to criticise it as sacrificing something of precision for the sake of avoiding technicality, it contrasts very favorably with the many popular books whose only merit is their style, since every page shows personal study. It is not surprising that a popular book on a group which has long been an object of special observation should contain little that is new; yet this is far from being entirely devoid of new matter, and is worthy of a place on the shelves of the specialist as well as of the amateur.

INDIAN FOLK-LORE AND ETHNOLOGY.

The Algonquin legends of New England; or, Myths and folk-lore of the Micmac, Passamaquoddy, and Penobscot tribes. By CHARLES G. LELAND. Boston, *Houghton, Mifflin, & Co.*, 1884. 400 p. 12°.

A migration legend of the Creek Indians, with a linguistic, historic, and ethnographic introduction. By ALBERT S. GATSCHET, of the U. S. bureau of ethnology. Vol. i. [Libr. abor. Amer. lit., iv.] Philadelphia, *Brinton*, 1884. 257 p. 8°.

THE comparison of languages, if made on scientific principles, affords undoubtedly the best, and indeed the only sure, means of tracing the relationship of different branches of the human race. Next to this method, though at a long interval, comes the study of their myths and legends. This study, though inferior in the certainty of its deductions to that of comparative philology, has certain evident advantages in other respects. We learn from it the intellectual and moral traits of the people who preserve and repeat the legends. We get to understand their habits of life, their ways of thought, their views of this world, and their ideas of a future life. Occasionally, also, we gather traces of genuine tradition, sometimes even of a far distant past, which, when corroborated by the evidence of language and perhaps other memorials, may be of real historical value.

Mr. Leland has been obliged by want of space, as he tells us, to exclude from his present work the historical legends which he has collected, and which, it is to be hoped, will be hereafter published. His work is thus entirely made up, as its titlepage professes, of what may properly be termed the 'myths and folk-lore' of the eastern or Abenaki branch of the great Algonquin race. As such it must be deemed one of the most valuable as well as most interesting contributions that have been made to this department of knowledge. The collection comprises some seventy stories, distributed under different heads, such as 'Gloosh-hap the divinity,' 'The merry tales of Lox the mischief-maker,' 'The amazing adventures of Master Rabbit,' 'The Chenoo legends,' 'Tales of magic,' and some minor divisions. The whole work shows the hand of an experienced writer, who is at once practised in the literary art, and alive to the requirements of science. The stories themselves display much imaginative power and a genuine sense of drollery. As evidence of intellectual capacity in their framers, some of them will bear comparison with any thing contained in Grimm's Teutonic legends. Mr. Leland is disposed to consider them superior to the legendary tales of the other Indian tribes, but in this view he is certainly mistaken. There is no reason for supposing that the Abenaki Indians surpassed in intelligence the Algonquin tribes of the west and south, or their neighbors of the Huron-Iroquois stock. These, indeed, are known to possess a folk-lore of remarkable extent and interest, which, in the specimens we possess, is not at all inferior to that disclosed to us in the present volume.

The author, in his preface, modestly announces that his chief object has been, not to discuss theories, but to collect and preserve valuable material for the use of better ethnologists to come hereafter, who, as he humorously suggests, "will be much more obliged to him for collecting raw material than for cooking it." This captivating humility, the reader

presently perceives, is merely an exhibition of the highest literary skill, for it preludes the suggestion of the most novel theory thus far propounded in regard to the mythology of any Indian tribe. This theory, which is sustained with much ingenuity and learning, supposes that the myths current among the north-eastern Algonquins are in great part derived from, or colored by, the legends of the Norse mythology. The author assumes that the Norse colonists, who dwelt for three centuries in Greenland, having there at one time as many as a hundred and ninety villages, taught these ancient legends to their Eskimo visitors and dependants, by whom the stories were in turn communicated to their Algonquin neighbors. He points out many resemblances in the personages and incidents of the two mythologies which are certainly remarkable; and he even traces the name of the mischief-making semi-deity Lox of the Abenakies to the evil-working Loki of the Edda tales. At times, however, he finds these resemblances of folk-lore extend to so much wider limits, both in the old world and in the new, that he is disposed to refer them to a far earlier and more primitive intercommunication, prevailing at the time when one pre-Aryan race inhabited both continents.

There is nothing incredible, or indeed improbable, in either theory. Without necessarily adopting them, — and the author himself has not fully made up his mind about either of them, — students of folk-lore may be grateful to any thoughtful fellow-worker who can suggest new lines on which their inquiries may be conducted. They will not, of course, forget the more common explanation, which supposes that similar beliefs may often arise from mere similarity of circumstances. Given the striking resemblance which Mr. Leland himself has well pointed out, between the regions inhabited by the Norsemen and by the Abenakies, and in the character and pursuits of the two races, can we then account for all the coincidences of their folk-lore? Half a dozen resemblances of words, like that between Loki and Lox (which, by itself, may be a mere accident), would suffice to settle this question and to establish Mr. Leland's Norse theory. The decisive value of language as a test in ethnological investigations could hardly be better exemplified than by this statement, the force of which every one will appreciate. Until this test has been satisfied, the author's theory remains only an ingenious and plausible suggestion.

Mr. Gatschet's work, as might be expected from his former publications, is of a purely scientific character; but in this sphere it takes a wide range. It is based on an ancient legend of the Creek or Maskoki Indians, which is partly mythological, and partly historical. This legend, of which the text and translation are given at the close of the present book, is to be more fully elucidated in the forthcoming volume. As it treats of the origin of the Creek nation, and their journeyings from the west, with their wars and other adventures among the people whom they encountered until they arrived at the eastern region in which they were found by the whites, the author has deemed it a suitable basis for a full description, not only of the Maskoki tribes themselves, but also of the surrounding communities. His first or introductory volume thus comprises an account of all the southern tribes of the United States, from the Atlantic seaboard to the western limit of Louisiana, so far as these are known. The history and character of each tribe, and its ethnical relations, are clearly explained. The classification is based on language, which the author justly considers to be the only scientific method. He has devoted much attention to the languages of the Maskoki stock, and gives abstracts of the grammatical characteristics of several of these tongues, which will be of much use to students of philology. The systems of government of the various tribes, their social usages, their modes of warfare, and their religious views and rites, are described with many interesting details. The volume forms a thesaurus of authentic information concerning the southern races, and will hold a high position as an authority on the ethnology of these tribes, and the archeology of the region which they formerly inhabited. The more extended notice which its contents deserve must be deferred until the appearance of the second volume.

RECENT CHEMICAL TEXT-BOOKS.

Traité pratique d'analyses chimiques et d'essais industriels. By Raoul Jagnaux. Paris, *Doin*, 1884. 12+503 p. 8°.

The elements of chemistry. By F. W. Clarke. New York, *Appleton*, 1884. (Appleton's science text-books.) 10 + 369 p., illustr. 8°.

Lessons in chemistry. By W. H. Greene. Philadelphia, *Lippincott*, 1884. (Lippincott's science series.) 357 p., illustr. 8°.

A short text-book of inorganic chemistry. By Dr. Hermann Kolbe. Translated and edited by T. S. Humpidge. New York, *Wiley*, 1884. 16+606 p., 1 pl. 8°.

JAGNAUX's little book treats chiefly of the analysis of minerals, metals, and alloys. Although it is not intended for beginners, according to the author's preface, the details of the various processes are often described with great care; and, moreover, a considerable amount of descriptive chemistry, mineralogy, and metallurgy is introduced, which any practical chemist in need of such information would certainly prefer to look for elsewhere in a more complete form. While the methods described are in the main those usually followed in certain cases, one cannot help wondering at the author's choice of method, or at his strange omissions. Thus he describes for the commercial assay of manganese only the method of Levol. Under the head of 'Potash and soda' he mentions no indicator but litmus, directs that this should be used with carbonates and bicarbonates, and says nothing of the convenience of a normal alkaline solution. For the volumetric determination of iron he directs the use of a solution of potassic permanganate, obtained by fusing manganic dioxide with potassic hydrate and potassic chlorate, dissolving in water, and adding nitric acid until the liquid has a purple color. The author calls attention to the novelty of certain methods, but he gives nowhere any discussion of the accuracy attainable by these or the older methods; so that the reader is unable to judge of their merit without actual trial.

A very convenient feature of the book is the frequent introduction of tables showing the composition of the more common substances, both natural and artificial.

In his 'Elements of chemistry' Prof. F. W. Clarke presents briefly but clearly the more important chemical theories, together with the usual amount of descriptive chemistry. The student who wishes more extended information will find useful references to larger works or more special treatises. The hundred or more experiments which are described seem to be well chosen, and, as a rule, require but simple apparatus and inexpensive material.

A brief sketch of the carbon compounds is introduced, but the author fails to improve the opportunity thus offered to explain the isomerism peculiar to them. Although he illustrates (p. 307) the structure of certain metameric compounds, he passes over in silence the existence of isomeric propyl, butyl, and amyl alcohols. The fundamental facts of isomerism would seem more important to the beginner than the structure formulae of naphthalene, anthracene, pyridine, or chinoline, or the composition of populin, fraxin, phloridzin, aesculin, all of which he gives.

In the excellent advice to teachers with which Dr. Greene prefaces his 'Lessons in chemistry,' he says that "the object of a limited course in chemistry is not to make chemists of the pupils, but to teach them what chemistry is, what it has accomplished, and what it may accomplish."

This object he has kept steadily in view in writing the book. While many of the more common elements are treated quite fully, he has very properly omitted entirely all description of the rarer elements with which many of the elementary text-books are encumbered.

The space devoted to the compounds of carbon is unusually large. Although the treatment of the subject is necessarily brief, the student cannot fail to get some notion of the broad field upon which so large a number of chemists are now at work.

While we can hardly discuss in detail the facts given, and the method of presenting them, we may say that the old formula of Kekulé for benzol seems quite as well justified by facts as the prism formula of Ladenburg, which he gives, and that by its means the facts of aromatic isomerism are more readily rendered intelligible. We would also note that one or two statements with regard to the higher fat acids are misleading or erroneous.

The plates introduced by Professor Clarke and Dr. Greene, to illustrate spectrum analysis, are such distressing caricatures of nature that they might better have been suppressed.

Dr. Kolbe tells us in the preface to his short text-book that it has been written "to recall to the memory of students who have attended a course of lectures on experimental chemistry, what they have seen and heard," and that in writing it he has adhered to the general principle which should lead the lecturer in chemistry, and that is, "to give to his hearers an idea of chemical processes and the most important chemical theories without burdening their memories with a large number of mere facts." Admirable as this principle may be, it does not seem to have led the author, in this case, to give us any thing particularly novel, at least as far as the descriptive portions of the book are concerned. Its style, it is true, is fresh and entertaining: and yet we can hardly agree with the editor in thinking that it will supply any definite want among teachers or students. Aside from the purely descriptive portion, which certainly is admirable, the book seems to possess a decided disadvantage, in that the necessary theoretical introduction is unsatisfactory. It is true that the editor has done his best to remedy its defects by introducing

into the text brief statements of the laws of Gay-Lussac, Arogadro, Dulong, and Petit, and by adding an appendix upon the determination of atomic and molecular weights. Still, it strikes us that these alterations in the text might have been carried farther with advantage. As it is, the student can hardly fail to be confused by the passage from equivalent to atomic weights; and the book should have recalled to his memory a discussion of molecules and molecular weights in order to make the transition intelligible. The subsequent chapter upon valence makes this omission all the more noticeable.

NOTES AND NEWS.

Commander Bartlett's annual report on the operations of the U. S. hydrographic office makes a good showing for activity and enterprise. Lists of lighthouses and 'notices to mariners,' in which bearings are given in degrees from true north, instead of magnetic bearings in points, as formerly, have been liberally published; the official correspondence with other hydrographic offices has been increased; and a complete set of the charts issued by all nations is kept on file, and is always at the service of the public for the determination of any questions relating to hydrography. The only vessel engaged in making surveys during the year was the Ranger, on the west coast of Mexico and Central America; but it is strongly recommended that new surveys be undertaken in several regions where they have long been wanted. The charts of the northern coast of South America are mostly based on old Spanish surveys dating back to 1794. 'Watson's rock,' latitude 40° 17′ north, longitude 53° 22′ west, in the path of North-Atlantic traders, has been reported so many times that its existence ought to be definitely settled or unsettled. The recommendation of previous hydrographers with regard to surveys of the Caroline and Marshall Islands, in the equatorial Pacific, should no longer be neglected: they lie in the belt of the trade-winds and westerly current, the natural highway of vessels crossing the ocean to Japan, China, and the East Indies, and require immediate examination. In the North Pacific alone there are over three thousand reported dangers that need decisive observation. In many cases the same island has half a dozen different positions, with as much as fifty miles between the extremes. It is urged that every naval vessel be provided with modern sounding-apparatus, by which even deep-sea measures can be quickly made, and required to sound wherever the charts show no depths reported within twenty miles on any side; and it is desired that a ship should be fitted out expressly to make investigations into ocean temperatures at all depths, and thus obtain data necessary to complete the determination of the actual oceanic circulation.

— In an attractive volume entitled 'Higher education in Germany and England' (Kegan, Paul, & Co.), which may be read through at a sitting, Mr. Charles Bird has given an account of what is done in Stuttgart, Germany, for the promotion of higher education. In a recent visit to the capital of Wurtemberg, it occurred to him to describe the educational equipment of a German town, and to institute a comparison between what is already done in Germany, and what is hoped for in England. All three varieties of high schools, — the gymnasium, the real-gymnasium, and the real-school, — corresponding very closely in their purposes to our colleges and scientific schools, are maintained in Stuttgart; but the university is wanting. There is, however, a *Polytechnicum*, which, as most of our readers are aware, has nearly the same relation to the real-schools as the universities have to the gymnasia.

The book, being written by an expert for a specific public purpose, is excellent reading. Among many things which we might cull, we select a table showing where the school population of Stuttgart may be found. It is estimated that one-seventh of the population, or 17,000 persons, should be under instruction; and of this number, 15,550 are thus accounted for:—

At universities	100
At the polytechnic	350
At the baugewerk schule	600
At the art school	300
At the two gymnasiums	1,300
At the real-gymnasium	900
At the realschule	1,100
At the two girls' high schools	900
At the burger school for boys	1,000
At the burger school for girls	1,000
At the volkschulen for boys	4,000
At the volkschulen for girls	4,000
Total	15,550

Higher than elementary, 7,550; elementary, 8,000.

How would our American towns bear comparison with Stuttgart?

— It is now proposed to carry the railway-trains across the English Channel on steamers; and the London, Brighton, and South coast railway company is having constructed at Glasgow two propellers suitable for the purpose.

— Stenographic notes of Sir William Thomson's course of eighteen lectures at the Johns Hopkins university, on molecular dynamics, were taken by Mr. A. S. Hathaway, B.S., Cornell university, lately a mathematical fellow of the Johns Hopkins university; and these notes, with additions subsequently made by the lecturer, have been carefully reproduced by the papyrograph plate process. A bibliography of the subjects considered will also be given with the lectures. In all, there will be about three hundred and fifty pages quarto. A few copies are offered for sale at five dollars net. The edition is strictly limited to three hundred copies; and orders should therefore be sent at once to the publication agency of the Johns Hopkins university, Baltimore, Md.

— A third series of Johns Hopkins university 'Studies in historical and political science,' comprising about six hundred pages in twelve monthly monographs devoted to American institutions an

economics, is offered to subscribers at the former rate, three dollars. As before, a limited number of 'studies' will be sold separately, although at higher rates than to subscribers for the whole set. Special announcements will be made in December as to the subjects of the early numbers in the third series, for which subscriptions will now be received. In general it may be said, that the new series will include papers on local and municipal government, state and national institutions, and American economic history. The very limited number of complete sets of the first series now remaining in the hands of the publication agency of the university, compels the announcement that no further subscriptions for that volume can be received at the original rate of three dollars. A few sets, bound in cloth, will be sold at five dollars net, by the publication agency only. The future interests of the work represented by this journal will require the agency to give preference, in disposing of the remainder of the first series, to libraries, specialists, and other patrons who are likely to prove continuous subscribers to the 'studies.'

— At the requisition of the Paris prefect of police, Messrs. Dujardin, Beaumetz, Pasteur, and Roux performed experiments with the view of ascertaining what would be the best gas for disinfecting rooms in which patients have suffered from contagious affections, and have come to the conclusion that sulphurous-acid gas would be the most efficacious for such purposes; but instead of simply burning sulphur, as is done in the barracks and military hospitals, they recommend the burning of bisulphide of carbon as being the least expensive, and the least injurious to the furniture, or articles of metal, in the room. This recommendation is not new, but it is satisfactory to have it stamped with the authority of the distinguished Frenchmen.

— Among recent deaths we note the following: J. A. Barral, agricultural chemist, editor of Arago's works, at Paris, in his sixty-fifth year; Dr. J. J. Woodward, U. S. A., microscopist, well known for his micro-photographs, at Washington; Dr. Th. Köstlin, formerly professor of natural history, Sept. 1, at Stuttgart; Dr. Heinrich Schellen, physicist, author of 'Spectral-analyse,' 'Magnet- und dynamo-electrische maschinen,' 'Electro-magneticher telegraph,' etc., Sept. 3, at Cologne, in his sixty-sixth year; O. J. Fahraeus, coleopterist, May 28, at Stockholm, in his eighty-eighth year; George Brettingham Sowerby, conchologist, author of 'Thesaurus conchyliorum,' July 25, at London, in his seventy-second year; Dr. A. Foerster, a well-known hymenopterist, Aug. 13, at Aachen, in his seventy-fourth year.

— The Imperial sanitary department at Berlin has been arranging for a series of investigations dealing with the practical dangers arising from the use of petroleum, in comparison with the point of ignition as fixed by Abel's apparatus. The ignition of gases which are to be found above the oil, and the nature of such ignitions as are caused by injury to the oil-reservoir, or by throwing down the lamps, will also receive attention. As all artificial trials of this kind are more or less unreliable in the results obtained, the investigations will deal with the cases of petroleum ignition which have actually taken place. The examination will deal with hanging-lamps, standing-lamps, cooking-appliances, etc.

— The Ainos are distinguished from all the Mongolian peoples surrounding them by their dark complexion, their luxuriant growth of hair, their thick, long beard, heavy mustache, and their European rather than Asiatic features. During his journey in Kamtchatka, Dybowski visited the Island of Saghalin, and took the opportunity of collecting some bones of the Ainos. The following account of the graveyards of the Ainos he sent to Koperniki: —

Unfortunately, almost all the graves have already been rifled by the Russian soldiers, who hoped to find gold and silver buried with the bodies: hence I have found, outside the graves, skulls without the lower jaw. Many, indeed, are broken into small pieces. Very few graves are left entirely undisturbed; viz., those only which are covered with turf, and consequently more difficult to find, and which can hardly be opened without implements; but with these one is not allowed to enter the graveyard, for the opening of graves is forbidden. On account of this prohibition, the search of the graves was made very difficult for me, as I was forced to dig with my hands, or only with a small stick. Fortunately the graves of the Ainos are not deep: they extend north and south, the head buried towards the north. On the right side of the grave, which is covered with turf, are embedded three low pillars about three inches thick and one and a half feet long. On the left side, at the foot of the dead, is found a thin, pointed stick, thrust deep into the earth. The upper end of it is cut in the form of a human head, with two inclined lines running downwards and outwards, as if they were intended to indicate two streams of tears, or perhaps only the eyes. A yard and a half under the sward are found split (not sawn) planks, which rest upon other planks that make the walls of the grave, so that the corpse lies in an empty space. The dead is in the same clothes which he wore when alive, and is provided with the same ornaments which he then carried. On the planks over the head of the dead, I have always found three lacquered wooden boxes, and near the feet one large box, also lacquered. On the body I have always found a knife, a tinder-box, a piece of touch-wood, and a pipe.

According to the accounts of eye-witnesses, the religious conceptions of the Ainos appear to be a degenerate and crude feticism. These conceptions are based upon a worship of numerous good and bad spirits or gods, as god of the sun, of the stars, of the sea; worship of the family guardian, of sea and land animals and plants, as also of forest animals. The Ainos have no conception of the continuation of the soul after death, and consequently no service for the dead.

— At the first monthly meeting, Oct. 15, this winter, of the Russian geographical society, the secretary mentioned that the observations of the polar

station at Sagastyr (mouth of the Lena) were ended, and the greater number of the party expected to return this autumn. Only Dr. Bunge staid behind, on account of an entire mammoth, which has been known for some years to exist not far from Sagastyr, and which he was eager to secure. This work, on account of the frozen soil, proved to be a rather arduous task, and he is not expected back until next winter. Leaving seven men of his party at Zaïdam, Prjevalski has started for the sources of the Yellow River. He was expected to return to Zaïdam in August. According to the latest news, Potanin was about to start from Peking, going to Kukuchoto, not by the ordinary road already visited by Europeans, but by Utaš. This place is interesting on account of a Buddhist monastery, a famous place for pilgrimages, and on account of the proximity of mountains said by the Chinese to be ten thousand feet high. The secretary also mentioned the ethnographical travels of three members, — Istourine, who visited Archangel; and Houetz and Wolter, who travelled among the Letto-Lithuanian population of the government of Wilna, Witebsk, and Kowno.

This was followed by a communication on a partial ascent of the Elborus by the mining engineer, Iwanof, well known for his travels in the Pamir in 1883. The natives are convinced that the ascent is impossible; yet the south-eastern summit was ascended in 1869 by Freshfield, Moore, and Tucker; the north-western, by Grover, Gardiner, etc., in 1874; and the western, by Dechy in 1884. Unfortunately these travellers were not scientific men. Russian travellers were less fortunate in their attempts, but their work was more useful to science; for example, that of Muschketone who explored the glaciers on the south-east of the mountains. Iwanof could not ascend farther than 15,700 feet, being prevented by a severe snow-storm. He was obliged to go with his travelling companion only above 13,000 feet, their native porters refusing to go farther, notwithstanding the steepest slopes were below; the gradient from that place upward being very easy, mostly 10° and below. At nearly 15,000 feet, before the snow-storm was reached, the temperature was rather high, —1½° C. Iwanof thinks, that, though access from other directions may be easy, the Elborus will be ascended from the south-east, as on that side there is a considerable population to an elevation of more than 8,000 feet; and thus supplies, porters, etc., may easily be obtained, and the great drawback of mountain travelling in the Caucasus avoided. He mentions especially the assistance which can be obtained here from a native gentleman, Prince Ismael Uruskief, through his practical knowledge of the mountains.

— The *Oil and colourman's journal* for October contains an interesting article on the Scottish mineral-oil trade. It is only about thirty years since James Young began his famous Bathgate oil-works, and only about twenty since the attempt was first made to start shale distilling-works. Now the amount of oil shale brought to the surface daily is about 5,000 tons. The whole of that is distilled for the production of solid paraffine, paraffine-oil, and collateral products yielding at the rate of 50,000,000 gallons of crude oil and 14,000 tons of sulphate of ammonia per annum. From that vast quantity of crude oil there are prepared about 500,000 barrels (each containing 40 gallons) of burning-oil, 30,000 tons (or upwards of 800,000 gallons) of lubricating-oil, and 19,000 tons of solid paraffine. Not less than £2,000,000 has been invested in the Scottish oil-works, most of which yields a handsome return. The annual value of the trade is now about £1,750,000, and the number of persons who directly get their living by the industry cannot be fewer than 9,500. The enormous American oil trade, however, makes skilful working a necessity to the Scotch. Continuous distillation has been the object in view now for many years, and this has at last been obtained through the process patented by Mr. Horman M. Henderson of the Broxburn oil company, which has now been in operation more than a year. Under this process the stills are found to work steadily, continuously, and uniformly. Impurities and heavy oil never accumulate, and the quality of the products is improved. The purified once-run oil is fractionated continuously in a connected series of three cylindrical stills.

— The producers of petroleum on the western shore of the Caspian Sea, it is said, have been seriously contemplating laying a pipe-line entirely across Persia to the Persian Gulf. If this were done, they claim that they would have the Asiatic market to themselves. This pipe-line would have to be something more than seven hundred miles long to reach the coast; and as it would for a long distance pass through a territory of savage Kurds, and other nomadic tribes, it is feared that it could not easily be kept in operation.

— The municipality of Issoudun has resolved to erect a monument to Nicholas Leblanc, the pioneer in the artificial soda industry. A hundred years ago the French government consulted the academy as to the best means of replacing the soda-supply, for which they had been dependent on Spain; and a prize of twelve thousand francs was offered to the inventor of a successful process for extracting the alkali from sea-salt. When Leblanc had fulfilled the conditions of the prize, the academy had ceased to exist: the inventor was obliged to renounce his rights, to close his factory, and to live in the extreme of penury, until finally he committed suicide.

— The council of the re-organized Archaeological institute of America met in New York, Nov. 20, and elected Prof. C. E. Norton of Cambridge, president; Prof. H. Drissler of New York, vice-president; Mr. George Wigglesworth of Boston, treasurer; and Dr. Frothingham of Baltimore, secretary.

— Mr. F. de la Touche, of the geological survey of India, has written a report on the Langrin coalfield, which is situated in the south-west Khasia hills, Assam. Mr. de la Touche says the coal-bearing rocks are exposed over an area of nearly eighty miles, and he thinks there is a large amount of coal available within a short distance of the plains. Limestone is also to be found in many parts of the country, and,

after being quarried in the coal season, is taken down to Sunamganj, on the Surma River, where it is burnt in holes in the river-bank, reeds being used as fuel. The lime is finally taken to Calcutta, but an interval of two years elapses from the time the stone is quarried until it is sent to market. It is suggested, that, if the coal on the spot were used in properly constructed kilns, a great saving of the time and expenditure would be effected.

— The French minister of instruction has despatched the following scientific missions: Mr. Brau de St. Pol Lias is sent to Sumatra and Malacca to make collections; Professor Guardia, to study the Balearic dialects; Mr. Étienne Gautier, to make investigations in natural history and anthropology in Asiatic Turkey and Persia; and Professor Henri Lerwis, to study leprosy in Norway.

— The composition and properties of the light emitted by insects of the Pyrophore genus form the subject of a paper recently presented to the Paris academy of sciences by Aubert and P. Dubois. The spectrum of the light, examined by the spectroscope, is very beautiful, but destitute of dark bands. When, however, the intensity diminishes, the red and orange disappear, and the green and yellow only remain.

— Admiral Cochrane of the English navy has recently suggested a novel plan for the defence of vessels of commerce from attacks of men-of-war. He proposes that these vessels should be armed with a pair of mortars of considerable range, placed in the same plane fifty to eighty feet apart, and so arranged that they may be simultaneously discharged by electricity. The mortars are each to be loaded with a small charge of powder; and on this is to be placed a buoyant, concussive torpedo of light weight and thin metal, which is to contain a bursting charge of gun-cotton or other high explosive. The torpedoes are to be connected by a light but very strong line from a hundred to two hundred feet long, the surplus of which is to be coiled about the torpedoes when in the mortar. When the mortars are discharged, the torpedoes will diverge slightly, and fall into the water some distance apart, where they will float with the line between them. If then the man-of-war in pursuit continues in a direct path toward her intended prey, she will run foul of the line, and the torpedoes will be drawn under her sides, and explode on contact.

— Some interesting fulgurites have been received by the National museum from Whiteside county, Ill. The largest one found measured two inches in diameter: it was unfortunately broken in transportation. The largest specimen of those received intact measures one inch and a half in diameter and four inches in length. Mr. Abbott, the donor of these specimens, states that he traced the tubes to a depth of seven feet in the sand.

— Past assistant surgeon H. G. Beyer, U.S.N., is giving a course of twelve illustrated lectures before the Naval medical society of Washington upon the development of vertebrate animals.

— A somewhat novel device for illustrating the microscopic structure of rocks has been brought into use in the geological department of the National museum. A series of photomicrographs was prepared from twelve thin sections of typical rocks, and the former were then thrown upon glass, forming transparencies twelve inches in diameter. The latter were afterwards colored by hand, the artist taking his tints from an examination of the sections themselves under the microscope and in polarized light. The transparencies thus produced are highly artistic in effect, and, on account of their accuracy and attractiveness, must prove an important addition to the educational series of the museum.

— The increasing interest in good methods of library administration is illustrated by a call for a conference of western librarians, to be held at Rock Island, Ill., Dec. 3, and to continue in session during two days. Mr. W. F. Poole of the public library in Chicago is the president and convening officer.

— To supplement the building-stone collection of the National museum in the way of illustrating the adaptability of certain kinds of stone to architectural purposes, a series of photographic negatives of some of the important stone buildings of the country has been obtained, from which enlarged prints (thirty inches by forty inches) have been prepared. These prints have been painted in a manner to show the natural colors of the stone of which the buildings are constructed. Among the prominent buildings represented are the Smithsonian institution, the University of Pennsylvania, the residence of Mr. William H. Vanderbilt (New York), and the Harvard law school (Cambridge).

— It is reported in Berlin that Dr. Koch has succeeded in transferring the cholera bacilli to several rabbits, which have died with all the symptoms of genuine cholera. The priority of success in this experiment is disputed by two Swiss physicians, Messrs. Nicati and Ritsch.

— The Japanese native papers are crying out at the extinction of the lacquer industry of the country. The trees from which the varnish is obtained are disappearing. Formerly, like the mulberry-tree on which the silk-worm feeds, it was protected by law. Each family of the upper classes was obliged to rear a hundred trees, the middle classes seventy, and the lower classes forty. Since this law became a dead letter, the cultivation of the lacquer-tree has rapidly declined. The trees were cut down without care, and none were planted to replace them, so that they have become exceedingly rare, while the price of lacquer has enormously increased. Similar complaints are heard of the process of deforestation going on in Japan since the ancient law, which required every one who cut down a tree to plant two in its place, was abolished.

— A Chinaman, named Chen-Ki-Souen, has written a monograph on the famous Chinese ink, commonly known as India ink, from a translation of which the *Oil and colourman's journal* prints the following abstract. The Chinese writer describes every stage of the preparation of India ink with great accu-

racy and elaborate detail. The author states that a kind of pigment ink was discovered somewhere between 2697 and 2597 B.C. It was employed for writing on silk with a bamboo rod. Afterward an ink was prepared from a certain stone, which is still known in China as Che-hei. It was not until about 200 B.C. that they began to make an ink from soot or lampblack. The soot was obtained by burning gum-lac and pine wood. This ink was made first in round balls, and very soon supplanted the stone ink. For a considerable period the province of Kiang-Si appears to have had a monopoly of ink-making. Under the dynasty of Tang, 613 to 915 A.D., there was a special officer, called an inspector, who had charge of its manufacture. He had to furnish the Chinese court with a certain quantity of this ink annually. Some of the factories seem to have been 'Royal Chinese' factories. The emperor Hinan Tsong (713–756 A.D.) founded two universities, to which he sent three hundred and thirty-six balls of ink four times a year. The most celebrated factory in China is that of Li-Ting-Kovei, who lived in the latter part of the reign of Tang, and made an excellent article. He made his ink in the shape of a sword or staff, or in round cakes. The test of its authenticity consisted in breaking up the rod, and putting the pieces in water: if it remained intact at the end of a month, it was genuine Li-Ting-Kovei. Since the death of this celebrated manufacturer, there seems to have been no perceptible advance made in the making of India ink. In the manufacture of lampblack, nearly every thing is used that will burn. Besides pine wood, we may mention petroleum, plant-oils, perfumed rice-flour, pomegranate bark, rhinoceros horn, pearls, and musk. Nor does fraud seem to have been entirely wanting. According to the best Chinese authorities, the best India ink smells like musk, and the addition of musk not only serves to give poor goods the resemblance of finer ones, but also actually makes them more serviceable. The binding-agent is the most important ingredient next to the lampblack. In former times glue made from the horns of the rhinoceros and of deer was employed: now only ordinary glue and isinglass are used. Good Chinese ink improves with age, and should not be used until a few years after it is made, but must be entirely protected from moisture. In using, it should only be rubbed backwards and forwards, as, for some unexplained reason, rubbing it round and round hardens it.

— D. Wedding, says the *Athenæum*, has been making experiments showing that the capacity for welding increases with the amount of silicon present, and decreases with any excess of manganese. The latter acts by interfering with the crystalline structure of the iron, and confirms Ledebur's idea that all adventitious bodies influence welding in proportion to their amount.

— Capt. Walker of the steamship Para at Philadelphia, Nov. 17, reports that on two successive occasions he thinks his vessel was saved by the use of oil. In one instance he was running before a heavy gale in the Formosa Channel, China, and the sea was remarkably high. His vessel was in great danger of being pooped, as she was coal laden and very deep. He concluded to try oil, and hung two canvas bags upon each quarter. Sufficient oil oozed through the canvas to answer his purpose, and the sea ceased breaking at once. Only four or five gallons of oil were expended in twelve hours.

Capt. Petersen of the Norwegian bark British Queen reports that about one year ago he commanded a vessel which was trying to make the port of Valencia, Spain, in heavy weather. Just before making the breakwater, the wind hauled ahead, and he was forced to let go his anchor. The storm increased, and seas swept over the vessel fore and aft. He lowered a canvas bag of oil from the jibboom, and the seas no longer broke over the vessel.

— The students of Berlin university have organized a new association among themselves, — a society of students of the science of dentistry. They have added the American stars and stripes to their banner in acknowledgment of the debt this science owes to the United States.

— Mr. Spence Paterson, British consul at Reykjavik, writes to the London *Standard* that on Sept. 9 he visited Cape Reykjanes, the south-west point of Iceland, in order to observe the volcanic island which recently appeared off that cape. It was first seen by the light-keeper at Reykjanes on July 20, and had then the shape of an irregular truncated cone, with a slight hollow on the top, and a projecting shoulder on the north side. No earthquakes or other volcanic manifestations accompanied its appearance; but on Aug. 5 a series of severe shocks occurred, which split the walls of the lighthouse, and damaged the lamps. For several days rain and fog obscured the island. When next seen, its shape had altered: part of the south side had fallen down into the sea, forming two little mounds, and leaving a steep, almost perpendicular face on the south. The height of the island is about two-thirds of its length. It lies about west-south-west of Reykjanes. Two officers of a French war vessel, who recently visited Reykjanes, estimate its distance from the coast at nine or ten miles, but Mr. Paterson believes it to be considerably greater. When first seen, the upper part of the island was perfectly black; but it has now begun to whiten, owing to the droppings of the myriads of sea-fowl which frequent the adjacent coast and neighboring islands, and seem already to have taken possession of the new land. The neighborhood of Reykjanes is noted for volcanic manifestations. Islands have from time to time risen and sunk there; and only a couple of years ago a violent eruption occurred near the spot where the new island lies: columns of smoke and steam rose out of the sea, and large quantities of pumice were thrown up, and floated ashore on the neighboring coast. *Nature* of Nov. 13 gives pictures of the past and present appearance of the island.

— Dr. Finsch, the German explorer, left Sydney in the Samoa on Sept. 10, to explore the Phœnix and Union Islands.